

# APEC Cyber Academy: An International Networked Learning Environment

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## INTRODUCTION

Web-based learning environments have become an integral part of both traditional face-to-face and online education (Bonk & Graham, 2006; Moore, 2005). Over the past decade, the boom of online learning has contributed to the creation of course management systems that are designed to provide better accessibility to students. Many of the systems claim to support pedagogical visions with good human-computer interfaces (HCI) that encourage peer collaboration, knowledge construction, mentoring, and community building, using such basic tools as content management, course delivery, discussion boards, and assessment modules. The functionalities of a Web-based learning environment can either dictate or extend the instructional activities that a teacher can apply in the classroom.

Most systems are primarily designed for college or adult learners, and only manage syllabi and instructional content. However, increasing numbers of students at primary and secondary levels are going online for at least some of their learning needs. In the U.S., for example, K-12 enrollment in online courses has risen from approximately 50,000 in 2001 to 700,000 during the 2005-2006 school year (Picciano & Seaman, 2007). Online participation seems especially strong in districts that are small or physically more isolated than others, as the Internet provides access to learning choices and resources not available otherwise.

## BACKGROUND

Online learning comes in a wide variety of shapes and sizes. It can be completely online or blended; it can be synchronous or asynchronous, or a combination of both; it can be collaborative or independent (Garrison & Anderson, 2003; Turoff, 2005). The key to both learning and computer mediation is the “notion of interaction,” that is, interaction with content, interaction with instructors, and interaction among learners. Interaction with content refers to how learners interact with the course materials and the concepts and ideas these materials represent. Interaction with instructors includes the ways in which instructors teach, guide, correct, and support their students. Interactions among learners can be formal or informal and take on many forms, such as debate, collaboration, discussion, and peer review. All modes of interaction support learning and each can be uniquely enacted in online learning environments (Moore, 1989; Swan, 2003). In addition, the three modes of interaction depend on each other in practice, whether in face-to-face or online environments (Rourke, Anderson, Garrison, & Archer, 2001).

Hillman, Willis, and Gunawardena (1994) propose that new technologies create a fourth type of interaction, at least temporarily. This interaction takes place between learner and HCI, that is, the specific technologies, platforms, and applications used to access learning tools and resources. The quality of the interface thus affords or constrains the quality and quantity of the other three interactions (Gibson, 1996). A good HCI is especially important when working with children in primary and secondary schools if it is to encourage peer collaboration, knowledge construction, mentor-

ing, and community building. Many sources have reported international standards for HCI and usability of Web-based content for learning. Among others, these standards include guidelines on functionality, interface, interaction, support and feedback, and use of graphics and multimedia (Bevan, 1995; Janicki & Liegle, 2001; Nielsen, 2004; Schneiderman, 1998; UsabilityNet, 2006).

Easy-to-use and understand functionalities that assist the development of rich interaction, reflection, and problem-based or project-based learning are even more important when Web-based learning interactions take place across countries, cultures, and languages. Unfortunately, very few Web-based learning environments provide pedagogical tools and quality HCI to support effective interactions and collaboration among K-12 learners in international settings. One example of a learning environment that is specifically designed to meet the various standards for a quality HCI and usable Web-based content for learning with children is the APEC Cyber Academy.

## **INTERNATIONAL NETWORKED LEARNING: APEC CYBER ACADEMY**

APEC Cyber Academy, a networked learning environment, was originally designed for K-12 students of APEC (Asia-Pacific Economic Cooperation) member economies, and was developed to address the specific characteristics in pedagogy and HCI that are essential for supporting international collaboration among primary and secondary school learners. The original intent was to provide a place for students and teachers to communicate, share, and engage in virtual learning experiences in an international context. Launched in 2002, the project is hosted by the APEC Digital Content Production Center currently under the auspices of APEC/EDNET and the Ministry of Education of Taiwan. With its emphasis on active learning and creative digital content, the APEC Cyber Academy has attracted a growing number of international users. As of January 2007, there were more than 14,000 registered learners from various countries around the world (Lin, Chou, & Bagley, 2007).

## **Theoretical Foundations**

The APEC Cyber Academy is founded on Vygotski's (1978) constructivist and Bandura's (1977, 1997) self-regulated learning theories. The two theories complement each other well in fostering learner-centered learning. While Vygotskian constructivism emphasizes knowledge is co-constructed with peers or experts and through immersion in a social context, self-regulated learning places a strong emphasis on cultivating an individual learner's ability to be an autonomous learner. As such, the APEC Cyber Academy serves as a venue for implementing innovative pedagogy that promotes motivation, creative thinking, critical thinking, and collaborative learning as outlined by Bonk and Reynolds (1997).

The main goal of the APEC Cyber Academy is to create an international learning environment for K-12 students to interact and collaborate on projects following the principles of social constructivism as well as self-regulated learning. The main objectives are: (1) providing a networked learning environment that follows the design principles of HCI to facilitate interaction for learning; (2) utilizing state-of-the-art technology to assist learning and assessment; (3) applying the pedagogical principles of collaborative learning into the design of online activities; (4) fostering international friendship among K-12 learners through online collaboration and computer-mediated communication; and (5) improving ICT (information and communication technology) skills through project-based learning.

## **Application of HCI Principles**

A good HCI helps to reduce anxiety and fear of computer usage, assists with smooth introductions for novice users, provides direct manipulation of objects, offers input devices and online assistance, and allows for information exploration through easy navigation (Markopoulos & Bekker, 2003; Schneiderman, 1998). As mentioned, abundant guidelines have been written on what constitutes a good interface for computer-based training and learning. Dunham and Sindhvad (2003) summarized usability studies on children's behavior and concluded the following HCI elements are most important in the design of a child-centered learning environment:

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